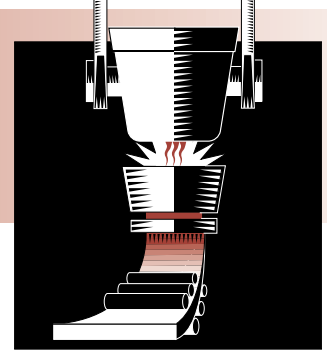


STEEL

Project Fact Sheet



DEPHOSPHORIZATION WHEN USING DIRECT REDUCED IRON (DRI) PELLETS OR HOT BRIQUETTED IRON (HBI)

BENEFITS

- Increased iron yield due to minimized slag flushing
- Reduced phosphorous reversion from the slag to the steel which enables the use of high phosphorous DRI/HBI
- In addition to greater availability, the cost of such DRI/HBI may be lower by \$8-\$16 per ton
- Reduced greenhouse emissions since natural gas is used in the production of DRI/HBI

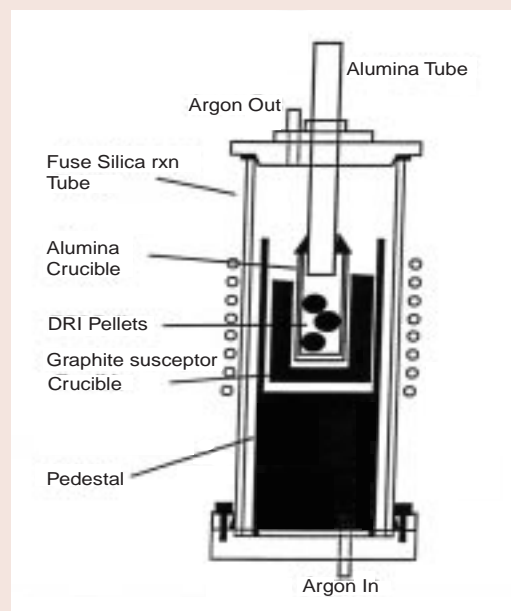
APPLICATIONS

Primarily applicable to basic oxygen furnace (BOF) and EAF steelmaking processes to reduce the phosphorus content of steel. Reduction in phosphorus content will provide a reduction in steel production cost and expand the use of DRI/HBI.

DEVELOPMENT OF A COMPUTER MODEL AND ITS APPLICATION TO OPTIMIZE PHOSPHORUS REMOVAL IN STEELMAKING WILL IMPROVE STEEL QUALITY

The increased production of high quality steels in the electric arc furnace (EAF) requires the use of scrap substitutes such as DRI and HBI. Although DRI/HBI products have lower contents of copper, nickel, etc. than scrap, they can contain five to ten times as much phosphorous. As a result, the phosphorous content of the steel may be too high. The objective of this research is to develop a real time, online process model to optimize phosphorous removal when using DRI/HBI.

PROCESS MODEL DEVELOPMENT



Experimental apparatus used for quick melting and quenching of DRI.



Project Description

Goal: To develop a real time on-line process model to optimize phosphorus removal in the steelmaking process.

This model will be verified through plant trials. The research consists of characterizing the phosphorous in the DRI/HBI, fast melting experiments to determine if it goes to the slag or metal, and fundamental laboratory experiments on the kinetics of the reactions. Two sets of plant trials are planned: 1) to determine the mass transfer parameters for an actual EAF; and 2) to develop and test a predictive phosphorus removal model.

Progress and Milestones

- Project start date, May 1999.
- Task I Experimental
 - Several different experiments were conducted to understand the mechanism of phosphorus reactions. Completion date, January 2001.
 - Experimental equipment for kinetic measurements has been built and is being used to collect experimental data on slag-metal reaction.
- Task II Plant Trials
 - Plant trials to determine mass transfer parameters at two or more plants are underway.
 - Conduct plant trials on phosphorus reactions, September 2001.
- Task III Modeling
 - Initial process model has been developed.
 - Complete first version of the model, January 2001.
 - Develop EAF model, September 2001.
- Task IV Complete Program
 - Analyze all data and write final reports, November 2001.
- Project completion date, December 2001.

Publications

- Behavior of Phosphorus in DRI/HBI in Electric Furnace Steelmaking, December 1999.



PROJECT PARTNERS

Carnegie Mellon University Center for
Iron and Steelmaking Research
Pittsburgh, PA
(Project Manager)

American Iron and Steel Institute
Washington, DC
(Principal Investigator)

Cleveland-Cliffs Inc.
Cleveland, OH

Ispat Mexicana, S.A.
Lazaro Cardenas, Mexico

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

Gobind Jagtiani
Office of Industrial Technologies
Phone: (202) 586-1826
Fax: (202) 586-3237
gobind.jagtiani@ee.doe.gov
<http://www.oit.doe.gov/steel>

Please send any comments,
questions, or suggestions to
webmaster.oit@ee.doe.gov.

Visit our home page at
www.oit.doe.gov.

Office of Industrial Technologies
Energy Efficiency
and Renewable Energy
U.S. Department of Energy
Washington, D.C. 20585



February 2001